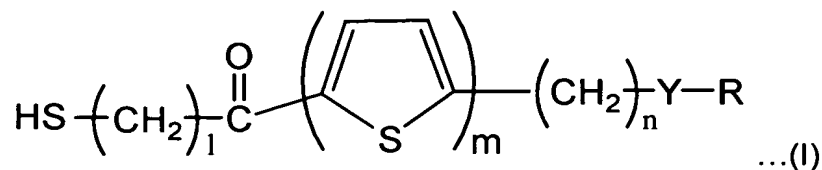


What is claimed is:

1. A conductive compound of formula (I) below:

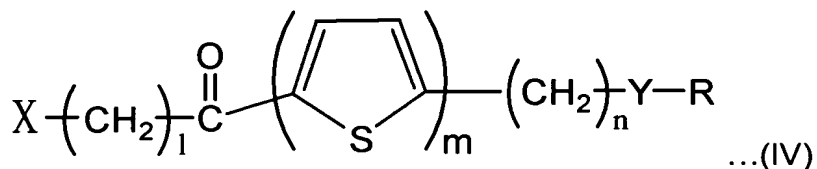


wherein Y is a carbonyl or -NH-; R is one of H, OH, a leaving group, and a probe group; l is an integer from 3 to 6; m is an integer from 1 to 4; and n is an integer from 0 to 3.

2. The conductive compound of claim 1, wherein the probe group is a nucleic acid or a protein.

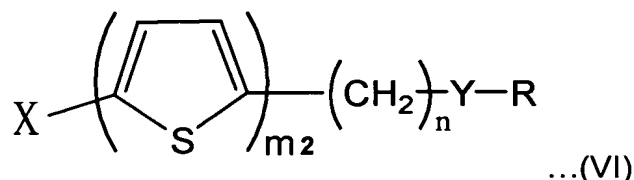
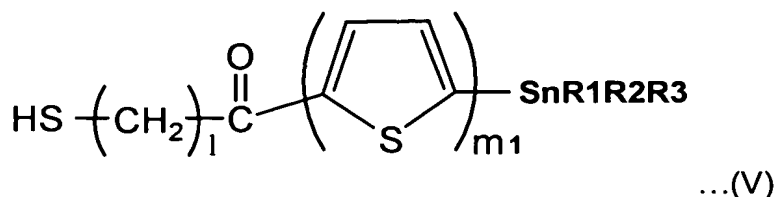
3. The conductive compound of claim 2, wherein the probe group is selected from the group consisting of a deoxyribonucleic acid (DNA), a ribonucleic acid (RNA), a peptide nucleic acid (PNA), an antibody, an antigen, an enzyme, a cofactor, and a substrate.

4. A method of synthesizing the conductive compound of said formula (I) of claim 1 by reacting a compound of formula (IV) below with thiourea:



wherein Y is carbonyl or -NH-, R is one of H, OH, a leaving group, and a probe group, X is halogen atom, l is an integer from 3 to 6, m is an integer from 1 to 4, and n is an integer from 0 to 3.

5. A method of synthesizing the conductive compound of formula (I) of claim 1, comprising reacting a compound of formula (V) below with a compound of formula (VI) below:



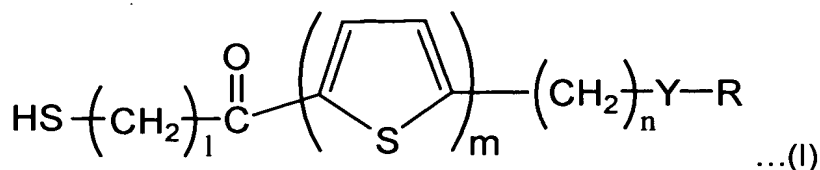
wherein R₁, R₂, and R₃ are independently C₁-C₈ alkyl groups; Y is carbonyl or -NH- group; R is one of H, OH, a leaving group, and a probe group; X is a halogen atom; l is an integer from 3 to 6; m₁ and m₂ are integers from 1 to 4 and 2 ≤ m₁ + m₂ ≤ 4; and n is an integer from 0 to 3.

6. An electrode coated with the conductive compound of said formula (I) of claim 1, the electrode being made of gold.

7. A sensor including an electrode coated with the conductive compound of said formula (I) of claim 1, the electrode being made of gold.

8. A target molecule detection method comprising:

(a) immobilizing a compound of formula (I) below on a gold substrate to form a self-assembled monolayer;



wherein Y is a carbonyl or -NH-; R is one of H, OH, a leaving group, and a probe group; l is an integer from 3 to 6; m is an integer from 1 to 4; and n is an integer from 0 to 3;

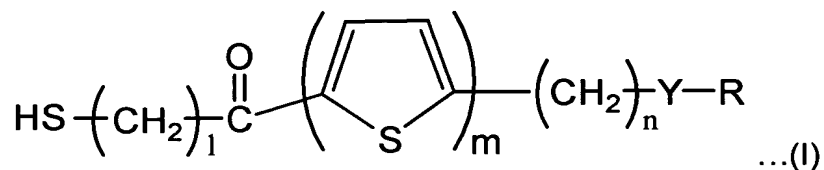
(b) reacting a surface of the self-assembled monolayer with probes;

(c) contacting a target molecule capable of specifically binding to the probes with the probes in the self-assembled monolayer; and

(d) measuring an electrical signal from the target molecule-probe complex.

9. A target molecule detection method comprising:

(a) immobilizing a compound of formula (I) below on a gold substrate to form a self-assembled monolayer;



wherein Y is a carbonyl or -NH-; R is one of H, OH, a leaving group, and a probe group; l is an integer from 3 to 6; m is an integer from 1 to 4; and n is an integer from 0 to 3;

10 (b) contacting a target molecule capable of specifically binding to a probe group R in formula (I) with the probes in the self-assembled monolayer; and
(c) measuring an electrical signal from the target molecule-probe complex.

10. The method of claim 8 or 9, wherein the electrical signal is measured from voltage or current variations.

15 11. The method of claim 8 or 9, wherein the probes or the probe group is selected from the group consisting of a deoxyribonucleic acid (DNA), a ribonucleic acid (RNA), a peptide nucleic acid (PNA), an antibody, an antigen, an enzyme, a cofactor, and a substrate.

20 12. The method of claim 8 or 9, wherein the target molecule is a nucleic acid or a protein.